Guidelines for Monitoring Public Drinking Water Supplies

Revised February 27, 2004

Environment and Labour

TABLE OF CONTENTS

1.0 Preface 1

2.0 Definitions 1

3.0 Roles and Responsibilities 2

3.1 Public Drinking Water Supply Owner 2
3.2 Nova Scotia Environment and Labour 2
3.3 Medical Officer of Health 3
3.4 Water Quality Laboratory (Lab) 3

4.0 Approved Water Supplies 4

4.1 Routine Monitoring for Microbiological Quality 4
4.1.1 Parameters 4
4.1.2 Sample Frequency, Number and Location 4
4.1.3 Sample Collection and Preservation 5
4.1.4 Reporting of Sample Results 5
4.1.5 Re-sampling Procedure 6
4.1.6 Compliance 6

4.2 Routine Monitoring for Chemical and Physical Quality 6
4.2.1 Parameters 6
4.2.2 Sample Frequency, Number and Location 7
4.2.3 Sample Collection and Preservation 8
4.2.4 Reporting of Sample Results 8
4.2.5 Re-sampling Procedure 8
4.2.6 Compliance 8

4.3 Daily Operational Monitoring 9
4.3.1 Disinfection Residual 9
4.3.2 Turbidity 10
4.3.3 Fluoride 10
4.3.4 Approval to Operate 10

4.4 Corrective Actions to be Taken When Bacteria Are Present 10
4.4.1 Immediate Notification 10
4.4.2 With Total Coliform Present, *E. coli* Absent 10
4.4.3 With *E. coli* Present 11

4.5 Boil Water Advisories 12
4.5.1 Deficiencies That Require a Boil Water Advisory 12
4.5.2 Deficiencies That May Require a Boil Water Advisory 13

4.6 Boil Water Advisory Protocol and Communication Plan 13
4.6.1 Initiating the Boil Water Advisory 13
4.6.2 Procedure for Notification of Boil Water Advisory 13
4.6.3 Suggested Wording for Boil Water Advisory 14
4.6.4 Follow-up Communication Plan for Boil Water Advisory 14
4.6.5 Instructions for Boiling and Disinfecting Tap Water 14
4.6.6 Removing the Boil Water Advisory 15

5.0 Registered Water Supplies 16

5.1 Routine Monitoring for Microbiological Quality 16
5.1.1 Parameters 16
5.1.2 Sample Frequency, Number and Location 17
5.1.3 Sample Collection and Preservation 17
5.1.4 Reporting of Sample Results 17
5.1.5 Compliance 17

5.2 Routine Monitoring for Chemical and Physical Quality 18
5.2.1 Parameters 18
5.2.2 Sample Frequency, Number and Location 18
5.2.3 Sample Collection and Preservation 19
5.2.4 Reporting of Sample Results 19
5.2.5 Re-sampling Procedure 19
5.2.6 Compliance 20

5.3 Corrective Actions to be Taken When Bacteria Are Present 20
5.3.1 Immediate Notification 20
5.3.2 Dug and Drilled Well Water Sources 21
a) No Obvious Signs of Well Construction Problems 21
b) Obvious Signs of Well Construction Problems 21
5.3.3 Surface Water Supplies 22

5.4 Boil Water Advisories 22
5.4.1 Deficiencies That Require a Boil Water Advisory 22

5.5 Boil Water Advisory Protocol and Signage 23
5.5.1 Initiating the Boil Water Advisory 23
5.5.2 Procedure for Notification of Boil Water Advisory 23
5.5.3 Instructions for Boiling and Disinfecting Tap Water 23
5.5.4 Removing the Boil Water Advisory 24

Appendices

A Sample Collection and Preservation – Microbiological Quality 25

B Sample Collection and Preservation – Chemical and Physical Quality 27

C The Growth of Biofilm in a Water Works System 29

D Draft Press Release for Boil Water Advisory 30

E Instructions for Boiling and Disinfecting Tap Water During a Boil Advisory 31

F Users That Must Take Particular Precautions During a Boil Water Advisory 32

GUIDELINES FOR MONITORING PUBLIC DRINKING WATER SUPPLIES

1.0 Preface

The purpose of these guidelines is to assist an owner of a public drinking water supply with developing and implementing an acceptable water quality monitoring program. The objective is to ensure that consumers of water provided by a public drinking water supply in Nova Scotia have safe drinking water. It is also recognised that a monitoring program should be part of a comprehensive water supply protection program and be used to assist with maintaining and optimizing water treatment operations.

These guidelines apply to a public drinking water supply as defined herein and include municipal, commercial, industrial, institutional, and privately owned water supplies. **It should be noted that these guidelines are considered to be minimum requirements and any conditions to an operating approval that the facility has or may require will always take precedence.**

2.0 Definitions

Public Drinking Water Supply (water supply) means a water works system for the provision to the public of piped water for human consumption where the system has at least 15 service connections or regularly serves 25 or more individuals per day at least 60 days of the year.

Water Works System means a water supply system where water is furnished or offered by an owner for human consumption, including the source, intake, treatment, storage, transmission or distribution.

Owner means a person who owns, operates or maintains a water works system.

Safe Drinking Water means water that meets the health-related criteria for substances specified in the most recent version of Health Canada's "Guidelines for Canadian Drinking Water Quality", as amended from time to time.

Water Quality Committee means an ad hoc committee appointed at the discretion of the Department of Environment and Labour (DEL) or the Medical Officer of Health (MOH) to investigate water quality deficiencies that require a boil water advisory. In addition to representatives from the DEL and the MOH, the committee may include an owner, a representative from a water quality laboratory and other experts as required.

Approved Water Supply means a publicly owned water works system that holds an approval under the *Activities Designation Regulations* made pursuant to the *Environment Act* for the collection, production, treatment, storage, supply or distribution of water for human consumption to residential and/or non-residential development in a municipality or part thereof.

Registered Water Supply means a publicly or privately owned water works system that holds a registration with the DEL under the *Water and Wastewater Facility Regulations* made pursuant to the *Environment Act* for the collection, production, treatment, storage, supply or distribution of water to the public for human consumption. Examples of registered water supplies include: trailer parks, apartment buildings, rural developments, schools, day cares, nursing homes, industrial or commercial buildings, eating establishments, fixed roof accommodations, recreational facilities, campgrounds, etc.

Human consumption means water that is used for drinking, cooking, food preparation, bathing, showering, dental hygiene or dishwashing.

Maximum acceptable concentration means the health-related criteria specified for substances in the "Guidelines for Canadian Drinking Water Quality", which when present above the set concentration have known or suspected adverse health effects.

Interim Maximum acceptable concentration means the health-related criteria specified for substances in the "Guidelines for Canadian Drinking Water Quality", which when present above the set concentration may have adverse health effects but there is insufficient toxicological data to set a maximum acceptable concentration.

3.0 Roles and Responsibilities

3.1 Public Drinking Water Supply Owner

An owner is responsible for delivering safe drinking water to the consumer. This responsibility includes routine monitoring of the public drinking water supply, informing the consumer and the Department of Environment and Labour (DEL) if water quality fails to meet the criteria set out in the "Guidelines for Canadian Drinking Water Quality" and for correcting any deficiencies that may result. The owner is also responsible for contacting the DEL as soon as he/she becomes aware of any problem that may result in unsafe water being supplied to the consumer such as equipment failure and/or malfunction. The owner shall have contingency plans in place to deal with poor water quality, major fluctuations in system flow and/or pressure, or a prolonged interruption in the supply of water.

3.2 Nova Scotia Environment and Labour

The Department of Environment and Labour (DEL) has been designated as the lead agency to take such measures as are reasonable to provide access to safe, adequate and reliable public water supplies (*Environment Act*, Section 104(c)). To carry out this mandate, the DEL issues approvals to construct and operate water distribution and water treatment facilities, classifies facilities, requires certified operators, registers public drinking water supplies, audits facilities and

ensures water quality monitoring programs are carried out and appropriate action is taken to address any problems that may arise. When a public drinking water supply owner fails to notify consumers that a public health risk exists, the DEL will cause a public notification to be issued, including the issuance of boil water advisories. The DEL may assist with non-routine or site-specific monitoring.

3.3 Medical Officer of Health (MOH)

The MOH provides advice to the Minister of Health, the Minister of Environment and Labour, the owner, the DEL and the public regarding public health concerns associated with drinking water supplies. The MOH may issue orders to protect the public health, including the issuance of boil water advisories.

3.4 Water Quality Laboratory (Lab)

The lab conducts analysis of samples following procedures defined in the latest edition of "Standard Methods for the Examination of Water and Wastewater", published jointly by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation, or an alternative method acceptable to the DEL. The lab also participates in quality control, quality assurance and accreditation programs, as required, to ensure accurate results. All sample analyses are to be performed by a laboratory acceptable to DEL.

The lab, when analysing water samples from a public drinking water supply, is responsible to immediately notify the water supply owner and the DEL of any sample results indicating the presence of coliforms.

APPROVED WATER SUPPLIES

4.0 Approved Water Supplies

The following sections apply to publicly owned water works systems that require an approval under the *Activities Designation Regulations* made pursuant to the *Environment Act* for the collection, production, treatment, storage, supply or distribution of water for human consumption to residential and/or non-residential development in a municipality or part thereof (i.e. approved water supplies).

4.1 Routine Monitoring for Microbiological Quality

4.1.1 Parameters

An owner shall monitor all public drinking water supplies for total coliform and *Escherichia coli (E. coli)* bacteria. Coliform bacteria (total or *E. coli*) are indicator organisms used to determine the efficiency of treatment and the integrity of the water works system. They are surrogates for less abundant and more difficult to detect human pathogens. *E. coli* bacteria is a sub-group of total coliform bacteria and is used as a screen for fecal contamination. Thus, the presence of coliform organisms in treated water indicates that barriers are ineffective and there is an increased chance for waterborne pathogens to follow the same pathway. However, the absence of coliforms does not guarantee safe water and the presence of coliforms does not necessarily indicate an immediate hazard. Generally, the presence of total coliform indicates that treatment is not effective or that there is a secondary contamination in the water works system such as from a cross-connection or biofilm growth or accumulation. The presence of *E. coli* indicates ineffective treatment and recent fecal contamination.

An owner shall ensure that all samples collected for routine bacteriological monitoring are tested for the presence of total coliform and *E. coli* organisms using methods listed in the latest edition of "Standard Methods for the Examination of Water and Wastewater". It is recommended that the samples be analysed using the presence/absence (P/A) method that permits both total coliform and *E. coli* organisms to be determined simultaneously.

4.1.2 Sample Frequency, Number and Location

An owner of an approved water supply shall sample the water supply routinely. The minimum number of bacteriological samples an owner shall collect from a water works system is set out in the most recent version of the "Guidelines for Canadian Drinking Water Quality" and shown in the following table:

Population Served	Minimum Number of Samples per Month
Up to 5,000	4
5,000 to 90,000	1 per 1,000 persons
More than 90,000	90 + (1 per 10,000 persons)

In many cases the number of samples necessary to obtain an accurate representation of a water works system will exceed these minimums. Sampling frequency from the system shall be at least weekly.

The sampling locations shall be chosen to be representative of the water works system and include central and peripheral locations. Buildings with prolonged periods of low or no use of water should be avoided as sampling locations.

For systems using surface water supplies, at least one water sample per week shall be collected from the point where the treated water enters the water works system.

The DEL may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to the "Guidelines for Canadian Drinking Water Quality".

4.1.3 Sample Collection and Preservation

All samples shall be collected and transported according to the standard procedures outlined in APPENDIX A.

4.1.4 Reporting of Sample Results

1) An owner shall ensure that results of all routine samples collected are sent from the lab to the owner. An owner shall record summaries of routine sample results in a uniform manner and make them available to the DEL upon request. The owner shall maintain records of sample results, including the original lab records, for a minimum of two years from the collection date.

2) Whenever the presence of coliforms is detected (total or *E. coli*), the lab shall immediately notify the water supply owner and the DEL. The owner shall also immediately notify the DEL and forward the results to the DEL. Receipt of any results sent electronically must be confirmed by telephone. If the local DEL office cannot be contacted for any reason, the environmental emergencies number is to be called at 1-800-565-1633.

3) Upon receipt of sample results indicating the presence of coliforms (total or *E. coli*), the owner shall comply with Section 4.4 of this Guideline, "Corrective Actions to be Taken When Bacteria Are Present". Depending on the particular circumstances, advice may be sought from the DEL.

4) If the results indicate deficiencies that require a boil water advisory (see Section 4.5), the owner shall notify and work cooperatively with the DEL and the MOH. The DEL and the MOH may appoint a water quality committee to investigate the problem.

4.1.5 Re-sampling Procedure

The owner shall re-sample all locations showing coliforms present immediately upon receiving the results. Depending on the circumstances, the DEL may require that the owner collect additional samples throughout the water works system. The owner shall make arrangements with the lab to ensure the samples are analysed when received.

All re-samples shall be analysed by the P/A method (e.g. Colilert™, Colisure™) for a 24-28 hour result to confirm the presence of coliforms (total or *E. coli*).

4.1.6 Compliance

An owner shall ensure that the drinking water meets the bacteriological quality requirements as set out in the "Guidelines for Canadian Drinking Water Quality".

Currently, the "Guidelines for Canadian Drinking Water Quality" require that:

> *The maximum acceptable concentration (MAC) for the bacteriological quality of approved water supplies is no coliforms detectable per 100 mL.*

However, because coliforms are not uniformly distributed in water and are subject to considerable variations in public health significance, this MAC will be applied in Nova Scotia as outlined in Section 4.4.

Section 4.4 outlines the corrective actions to be taken by the owner when coliform bacteria are present. When a boil water advisory is necessary (see Section 4.5), the owner shall comply with Section 4.6.

4.2 Routine Monitoring for Chemical and Physical Quality

4.2.1 Parameters

The owner shall monitor for general chemical and physical quality. The minimum

parameters to be monitored are shown in the following table and include inorganic and physical parameters with recommended limits in the "Guidelines for Canadian Drinking Water Quality" and some with no guidelines at the present time. These parameters are included in standard general chemical analysis and metal scan packages available at most labs.

The following parameters are considered to be minimum requirements and any conditions to an operating approval that the facility has or may require will always take precedence. The DEL may require additional parameters to be monitored as part of an approval to operate.

Alkalinity	Colour	Potassium
Aluminium	Conductivity	Selenium
Ammonia	Copper	Sodium
Antimony	Fluoride	Sulphate
Arsenic	Hardness	Total Dissolved Solids
Barium	Iron	Total Organic Carbon
Boron	Lead	Turbidity
Cadmium	Magnesium	Uranium
Calcium	Manganese	Zinc
Chloride	Nitrate	
Chromium	pH	

4.2.2 Sample Frequency, Number and Location

An owner of an approved water supply shall monitor a surface water supply at least annually or a groundwater supply at least once every two years. On each occasion two samples shall be collected, one sample from the raw water source and one sample from a point after treatment. The same sample points shall be used each year.

In many cases the number of samples necessary to obtain an accurate representation of a water works system will exceed these minimums. The sampling locations shall be chosen to be representative of the water works system and include central and peripheral locations.

If there is reason to suspect the presence of other substances not listed in the table in Section 4.2.1 in a public drinking water supply, an owner shall monitor for these substances to ensure that their concentrations are below acceptable limits.

The DEL may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to the

"Guidelines for Canadian Drinking Water Quality".

4.2.3 Sample Collection and Preservation

An owner shall collect and transport samples according to the standard procedures outlined in APPENDIX B.

4.2.4 Reporting of Sample Results

1) An owner shall ensure that the results of samples for chemical and physical quality are sent from the lab to the owner. An owner shall record summaries of routine sample results in a uniform manner and make the results available to the DEL upon request. The owner shall maintain records of sample results for a minimum of ten years from the collection date.

2) Upon receipt of results that indicate that a Maximum Acceptable Concentration (MAC) or an Interim Maximum Acceptable Concentration (IMAC) has been exceeded, the owner shall immediately notify the DEL and forward the results to the DEL. Receipt of any results sent electronically must be confirmed by telephone.

3) Where a MAC or IMAC is exceeded, the owner shall comply with Section 4.2.5 of this Guideline, "Re-sampling Procedure". Depending on the particular circumstances, advice may be sought from the DEL.

4.2.5 Re-sampling Procedure

Where results indicate that a Maximum Acceptable Concentration (MAC) or an Interim Maximum Acceptable Concentration (IMAC) has been exceeded, the owner shall collect a confirmation re-sample for that parameter as soon as possible after the initial results are received.

If the confirmation re-sample indicates that the MAC or IMAC is exceeded for the parameter of concern, the owner shall comply with Section 4.2.6 of this Guideline, "Compliance". Depending on the particular circumstances, advice may be sought from the DEL.

If the confirmation re-sample indicates that the MAC or IMAC is not exceeded for the parameter of concern, the DEL may require that additional samples be taken to further evaluate the need for compliance.

4.2.6 Compliance

Any public drinking water supply in which the level of a substance is confirmed to exceed a Maximum Acceptable Concentration (MAC) or an Interim Maximum

Acceptable Concentration (IMAC) is considered to be out of compliance with the health-related criteria specified in the most recent version of the "Guidelines for Canadian Drinking Water Quality". The water supply owner, in consultation with the DEL, shall develop an action plan for addressing such non-compliance issues.

The action plan shall:

1) determine why the water exceeds the MAC or IMAC;

2) select a corrective action(s) to remove the source of contamination, provide treatment or switch to an alternate supply;

3) provide a schedule for implementation of the corrective action(s) for meeting the MAC or IMAC.

After completing the corrective action(s), a water sample must be collected to demonstrate that the corrective action(s) has successfully reduced the concentration to below the MAC or IMAC given in most recent version of the "Guidelines for Canadian Drinking Water Quality".

The action plan shall be prepared and submitted to DEL within 30 calendar days from when the water supply owner confirmed the MAC or IMAC exceedance.

DEL will communicate with the MOH during this process.

4.3 Daily Operational Monitoring

4.3.1 Disinfection Residual

An owner using a disinfection system shall monitor daily for disinfection residual. A disinfection residual should be continuously maintained throughout the entire water works system. Where a chlorine disinfection system is being used, the goal for a free chlorine residual at distant points in a water works system should be a minimum 0.2 mg/L. Higher chlorine residuals may be required by DEL depending on other characteristics of the system but should not exceed 4 mg/L at any time.

Daily disinfection residuals should be recorded in a uniform manner and made available to DEL upon request.

> All municipal water supplies shall be disinfected. In addition, the DEL has established minimum treatment requirements for all municipal supplies derived from surface water sources, groundwater impacted by surface waters and secure groundwater sources. Treatment requirements are available on the web at: www.gov.ns.ca/enla/water/munich2o.htm.

4.3.2 Turbidity

An owner using chemically assisted filtration shall measure source and treated water turbidity at least once per day. An owner shall record daily turbidity measurements in a uniform manner and make them available to DEL upon request.

4.3.3 Fluoride

An owner using fluoridation shall monitor daily for fluoride concentrations at a representative location within the water works system. At no time should fluoride concentrations exceed 1.5 mg/L with an optimum range between 0.8 and 1.0 mg/L. An owner shall record daily fluoride measurements in a uniform manner and make them available to DEL upon request.

4.3.4 Approval to Operate

Any conditions to an operating approval that the water works system has or may require will always take precedence over the above requirements.

4.4 Corrective Actions to be Taken When Bacteria Are Present

4.4.1 Immediate Notification

An owner of an approved water supply shall contact the DEL immediately upon receipt of any sample result indicating the presence of total coliform or *E. coli*. When corrective action is to involve increased sampling (re-sampling) and/or weekend or public holiday monitoring, the lab is to be notified immediately.

4.4.2 With Total Coliform Present, *E. coli* Absent

Where total coliform are present in the absence of *E. coli*, the owner shall:

1) Immediately notify the DEL.
2) Re-sample at least the total coliform positive locations immediately.
3) Check disinfection residual:
   a) if there is inadequate residual throughout the system, increase disinfection;
   b) if there is no, or very low, disinfection residual at distant ends of the system, increase disinfection and flush water mains if necessary.

If the presence of total coliform is confirmed, the owner shall immediately begin an investigation to explain the presence of total coliform in the distribution system. The DEL, the MOH and the owner shall consider, on a case-by-case basis, one or more of the following actions to be included in the investigation:

1) Evaluate the effectiveness of treatment and the treatment plant:
   - determine if the disinfection equipment is working properly;
   - collect additional samples(s) of water leaving the treatment plant to see if it is properly disinfected (dosage/contact time);
   - analyse turbidity of water entering the water works system;
   - test for heterotrophic plate counts of raw and treated water and stressed coliform.
2) Evaluate the integrity of the water works system:
   - determine if water quality has deteriorated due to cross-connections, repairs, construction, loss of pressure, etc.;
   - collect additional samples to better characterize distribution system water quality.
3) Enumerate coliforms in samples to assess degree of contamination and possible point of entry.
4) Determine the species of coliforms retrieved from the water works system.
5) Request the MOH to survey doctor offices, hospital laboratories, etc. for increase in the incidence of waterborne gastrointestinal illness.
6) Review past history of the system and possibility of biofilm episode (see APPENDIX C).

A boil water advisory will be initiated at any time, in accordance with Section 4.6, if:

1) The owner is unable or unwilling to conduct the investigation.
2) The owner is unable or unwilling to take corrective action to remediate the cause of the positive samples.
3) The investigation indicates a problem that results in a threat to public health.
4) Any other circumstance in which it is believed that public health may be at risk from the water supply.

4.4.3 With *E. coli* Present

Where *E. coli* is present in any sample, the owner shall immediately notify the DEL. The DEL will notify the MOH.

The owner shall immediately initiate a boil water advisory, in accordance with Section 4.6, and immediately begin an investigation to explain the presence of *E. coli* in the distribution system. The DEL, the MOH and the owner shall consider, on a case-by-case basis, one or more of the following actions to be included in the investigation:

1) Resample at least the positive locations immediately.
2) Check disinfection residual:
   a) if there is inadequate residual throughout the system, increase

disinfection;
b) if there is no, or very low, disinfection residual at distant ends of the system, increase disinfection and flush water mains if necessary.

3) Evaluate the effectiveness of treatment and the treatment plant:
   - determine if the disinfection equipment is working properly;
   - collect additional samples(s) of water leaving the treatment plant to see if it is properly disinfected (dosage/contact time);
   - analyse turbidity of water entering the water works system;
   - test for heterotrophic plate counts of raw and treated water and stressed coliform.
4) Evaluate integrity of the water works system:
   - determine if water quality has deteriorated due to cross-connections, repairs, construction, loss of pressure, etc.;
   - collect additional samples to better characterize distribution system water quality.
5) Enumerate coliforms in samples to assess degree of contamination and possible point of entry.
6) Consider further microbiological analysis of samples from the water works system.
7) Request the MOH to survey doctor offices, hospital laboratories, etc. for increase in the incidence of waterborne gastrointestinal illness.
8) Review past history of the system and possibility of biofilm episode (see APPENDIX C).

4.5 Boil Water Advisories

4.5.1 Deficiencies That Require a Boil Water Advisory

Deficiencies that require a boil water advisory include:

1) Fecal contamination of drinking water evidenced by sample results indicating the presence of *E. coli*.
2) Lack of disinfection or failure of key water treatment process.
3) Use of emergency water supply from an unchlorinated or inadequately chlorinated source.
4) Other circumstances which in the opinion of the DEL or the MOH constitutes a risk to public health (e.g. *Giardia*, *Cryptosporidium* contamination, etc.).
5) Evidence of an outbreak of waterborne illness as determined by the MOH (the risk to young children, elderly and immuno-compromised people should be considered in a decision).
6) A serious incidence of raw water contamination.

Depending on the particular circumstances, advice may be sought from the DEL.

4.5.2 Deficiencies That May Require a Boil Water Advisory

Deficiencies that may require a boil water advisory include, but are not limited to:

1) Water that does not meet the "Guidelines for Canadian Drinking Water Quality" requirements for total coliform.
2) Suspected cross-connection or negative pressure.
3) Indicators of poor water quality such as ineffective disinfection due to high turbidity, high chlorine demand, etc. evidenced by sample results indicating the presence of total coliform in the water leaving the treatment plant and generally poor bacteriological water quality.

Depending on the particular circumstances, advice may be sought from the DEL.

4.6 Boil Water Advisory Protocol and Communication Plan

4.6.1 Initiating the Boil Water Advisory

Where one or more of the conditions described in Section 4.5.1 exists, the owner shall initiate the boil water advisory and contact the DEL immediately.

Where one or more of the conditions described in Section 4.5.2 exists, the owner may initiate the boil water advisory after consultation with the DEL.

In the event that the DEL or the MOH is aware of a potential serious health risk, the DEL will advise the water supply owner to initiate the boil water advisory.

When a boil water advisory is to be initiated, the owner shall provide a communication plan to the DEL for approval in accordance with Section 4.6.2. The DEL may approve or modify the plan depending on the seriousness of the event.

During the boil water advisory there should be frequent communication between the DEL, the MOH and the owner.

4.6.2 Procedure for Notification of Boil Water Advisory

1) The owner will inform consumers in a manner and frequency acceptable to the DEL and the MOH.
2) If the owner fails to notify the consumers, the DEL or the MOH will take appropriate steps to notify consumers.

The boil water advisory must be effectively communicated to the public. Consideration is to be given to placing the advisory in daily newspapers and in all other print media in the area. Local radio and television stations should be requested to broadcast the advisory on a frequent basis. All methods of

communication to the public are to be maintained throughout the duration of the advisory being in effect. In the case of an immediate serious public health threat other methods of notification, such as door-to-door and installation of signage, may be necessary.

4.6.3 Suggested Wording for Boil Water Advisory

"Due to water quality problems and the possibility of unsafe water, consumers are advised to boil all water for at least 1 minute before drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking, dental hygiene or any other activity requiring human consumption. This is to be done until further notice". (See APPENDIX D for recommended press release).

4.6.4 Follow up Communication Plan for Boil Water Advisory

After a boil water advisory has been issued, the owner shall keep the general public informed about the status of the advisory. A telephone hot line may be put in place by the owner during the boil water advisory. The hot line should be staffed for extended hours as needed.

Some businesses, institutions, manufacturing plants or health care facilities may have to take additional precautions during a boil water advisory. There may be circumstances where these facilities should be contacted as part of the owner's communication plan to assure compliance with these precautions.

Detailed Instructions for boiling and disinfecting tap water during a boil water advisory are included in APPENDIX E. Instructions for users that should take additional precautions are included in APPENDIX F.

4.6.5 Instructions for Boiling and Disinfecting Tap Water

During an advisory it is essential that all water to be used for the following activities be boiled:

1) drinking;
2) preparing infant formulas;
3) preparing juices and ice cubes;
4) washing fruits and vegetables;
5) cooking; or
6) dental hygiene.

Detailed Instructions for boiling and disinfecting tap water during a boil water advisory are included in APPENDIX E. Instructions for businesses, institutions, manufacturing plants or health care facilities that may have special requirements when a boil water advisory is in effect are provided in APPENDIX F.

4.6.6 Removing the Boil Water Advisory

The boil water advisory will be removed by the DEL, in consultation with the MOH and the owner. Under normal circumstances the boil water advisory will be removed when:

a) the "Guidelines for Canadian Drinking Water Quality" for bacteriological quality are met for 2 consecutive sets of samples separated by a minimum of 24 hours; and

b) the deficiencies which led to the boil water advisory are corrected; and

c) sufficient finished water displacement has occurred in the water works system to eliminate potentially contaminated water.

REGISTERED WATER SUPPLIES

5.0 Registered Water Supplies

The following sections apply to publicly or privately owned water works systems that hold a registration with the DEL under the *Water and Wastewater Facility Regulations* made pursuant to the *Environment Act* for the collection, production, treatment, storage, supply or distribution of water to the public for human consumption (i.e. registered water supplies).

5.1 Routine Monitoring for Microbiological Quality

5.1.1 Parameters

An owner shall monitor all public drinking water supplies for total coliform and *Escherichia coli (E. coli)* bacteria. Coliform bacteria (total or *E. coli*) are indicator organisms used to determine if drinking water is of good quality and free of microbial pathogens that can cause disease. Coliform bacteria are found in soil and in the intestines of warm-blooded animals, including humans. Monitoring for total coliform and *E. coli* bacteria therefore provides an indication of the degree of pollution impacting a drinking water supply source and its sanitary condition.

The presence of *E. coli* indicates that the source has been impacted by recent fecal contamination and therefore the water is unsafe to drink. The presence of total coliform in a non-disinfected well means that the well is prone to surface water infiltration and is therefore at risk of fecal contamination. The presence of total coliform in a disinfected system means the disinfection process has failed or has been overwhelmed. In the latter two cases, the water is considered unsafe to drink until the situation is remediated.

It is important to note that the absence of coliform bacteria does not guarantee safe water. Regular testing is required to check the safety of the water supply. Sampling should be carried out when the risk of contamination is greatest, such as during spring thaw, extended periods of heavy rain or drought, after lengthy periods of non-use or if the owner suspects any changes to the water quality.

An owner shall ensure that all samples collected for routine bacteriological monitoring are tested for the presence of total coliform and *E. coli* organisms using methods listed in the latest edition of "Standard Methods for the Examination of Water and Wastewater". It is recommended that the samples be analysed using the presence/absence (P/A) method that permits both total coliform and *E. coli* organisms to be determined simultaneously.

5.1.2 Sample Frequency, Number and Location

An owner of a registered water supply shall sample the water supply quarterly. Where a water supply is not in operation year round, at least one of the samples is to be collected prior to start up.

The DEL may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to the "Guidelines for Canadian Drinking Water Quality".

5.1.3 Sample Collection and Preservation

All samples shall be collected and transported according to the standard procedures outlined in APPENDIX A.

The owner shall record the water supply registration number on the lab form when submitting all samples for microbiological quality analyses.

5.1.4 Reporting of Sample Results

1) An owner shall ensure that results of all routine samples collected are sent from the lab to the owner. The owner shall maintain records of sample results, including the original lab records, for a minimum of two years from the collection date. An owner shall make sample results available to the DEL upon request.

2) Whenever the presence of coliforms is detected (total or *E. coli*), the lab shall immediately notify the water supply owner and the DEL. The owner shall also immediately notify the DEL and forward the results to the DEL. Receipt of any results sent electronically must be confirmed by telephone. If the local DEL office cannot be contacted for any reason, the environmental emergencies number is to be called at 1-800-565-1633.

3) Upon receipt of sample results indicating the presence of coliforms (total or *E. coli*), the owner shall comply with Section 5.3 of this Guideline, "Corrective Actions to be Taken When Bacteria Are Present". Depending on the particular circumstances, advice may be sought from the DEL.

5.1.5 Compliance

An owner shall ensure that the drinking water meets the bacteriological quality requirements as set out in the "Guidelines for Canadian Drinking Water Quality".

Currently, the "Guidelines for Canadian Drinking Water Quality" require that:

The maximum acceptable concentration (MAC) for the bacteriological quality of registered water supplies is no coliforms detectable per 100 mL.

For clarity, this means that no sample should contain *E. coli* or other coliform bacteria. This MAC will be applied in Nova Scotia as outlined in Section 5.3.

Section 5.3 outlines the corrective actions to be taken by the owner when coliform bacteria are present. When a boil water advisory is necessary (see Section 5.4), the owner shall comply with Section 5.5.

5.2 Routine Monitoring for Chemical and Physical Quality

5.2.1 Parameters

The owner shall monitor for general chemical and physical quality. The minimum parameters to be monitored are shown in the following table and include inorganic and physical parameters with recommended limits in the "Guidelines for Canadian Drinking Water Quality" and some with no guidelines at the present time. These parameters are included in standard general chemical analysis and metal scan packages available at most labs.

The following parameters are considered to be minimum requirements. The DEL may require additional parameters to be monitored.

Alkalinity	Colour	Potassium
Aluminium	Conductivity	Selenium
Ammonia	Copper	Sodium
Antimony	Fluoride	Sulphate
Arsenic	Hardness	Total Dissolved Solids
Barium	Iron	Total Organic Carbon
Boron	Lead	Turbidity
Cadmium	Magnesium	Uranium
Calcium	Manganese	Zinc
Chloride	Nitrate	
Chromium	pH	

5.2.2 Sample Frequency, Number and Location

An owner of a registered water supply shall monitor the water supply at least once every two years. If a treatment device is in place to remove any chemical or physical substances, two samples shall be collected, one sample from the raw water source and one sample from a point after treatment. The sampling

locations shall be chosen to be representative of the system and the same sample points shall be used when sampling.

In many cases it may be necessary to sample more frequently then once every two years to obtain an accurate representation of the registered water supply.

If there is reason to suspect the presence of other substances not listed in the table in Section 5.2.1 in a public drinking water supply, an owner shall monitor for these substances to ensure that their concentrations are below the acceptable limits.

The DEL may alter the frequencies, locations, numbers and parameters to be monitored depending on local conditions, analytical results or changes to the "Guidelines for Canadian Drinking Water Quality".

5.2.3 Sample Collection and Preservation

An owner shall collect and transport samples according to the standard procedures outlined in APPENDIX B.

The owner shall record the water supply registration number on the lab form when submitting all samples for chemical and physical quality analyses.

5.2.4 Reporting of Sample Results

1) An owner shall ensure that the results of samples for chemical and physical quality are sent from the lab to the owner. The owner shall maintain records of sample results for a minimum of ten years from the collection date. An owner shall make sample results available to the DEL upon request.

2) Upon receipt of results that indicate a Maximum Acceptable Concentration (MAC) or an Interim Maximum Acceptable Concentration (IMAC) has been exceeded, the owner shall immediately notify the DEL and forward the results to the DEL. Receipt of any results sent electronically must be confirmed by telephone.

3) Where a MAC or IMAC is exceeded, the owner shall comply with Section 5.2.5 of this Guideline, "Re-sampling Procedure". Depending on the particular circumstances, advice may be sought from the DEL.

5.2.5 Re-sampling Procedure

Where results indicate that a Maximum Acceptable Concentration (MAC) or an Interim Maximum Acceptable Concentration (IMAC) has been exceeded, the owner shall collect a confirmation re-sample for that parameter as soon as

possible after the initial results are received.

If the confirmation re-sample indicates that the MAC or IMAC is exceeded for the parameter of concern, the owner shall comply with Section 5.2.6 of this Guideline, "Compliance". Depending on the particular circumstances, advice may be sought from the DEL.

If the confirmation re-sample indicates that the MAC or IMAC is not exceeded for the parameter of concern, the DEL may require that additional samples be taken to further evaluate the need for compliance.

5.2.6 Compliance

Any public drinking water supply in which the level of a substance is confirmed to exceed a Maximum Acceptable Concentration (MAC) or an Interim Maximum Acceptable Concentration (IMAC) is considered to be out of compliance with the health-related criteria specified in the most recent version of the "Guidelines for Canadian Drinking Water Quality". The water supply owner, in consultation with the DEL, shall develop an action plan for addressing such non-compliance issues.

The action plan shall:

1) determine why the water exceeds the MAC or IMAC;

2) select a corrective action(s) to remove the source of contamination, provide treatment or switch to an alternate supply;

3) provide a schedule for implementation of the corrective action(s) for meeting the MAC or IMAC.

After completing the corrective action(s), a water sample must be collected to demonstrate that the corrective action(s) has successfully reduced the concentration to below the MAC or IMAC given in the most recent version of the "Guidelines for Canadian Drinking Water Quality".

The action plan shall be prepared and submitted to DEL within 30 calendar days from when the water supply owner confirmed the MAC or IMAC exceedance.

DEL will communicate with the MOH during this process.

5.3 Corrective Actions to be Taken When Bacteria Are Present

5.3.1 Immediate Notification

An owner of a registered water supply shall contact the DEL immediately upon

receipt of any sample results indicating the presence of total coliform or *E. coli*.

5.3.2 Dug and Drilled Well Water Sources

Where total coliform or *E. coli* are present, the owner shall:

1) Immediately notify the DEL.
2) Immediately initiate a boil water advisory, in accordance with Section 5.5, or seek an alternate potable water supply until satisfactory bacteriological quality is restored.

The DEL will inspect the registered water supply to verify that it meets the requirements of the *Water and Wastewater Facility Regulations* and the *Well Construction Regulations*, and to determine whether there are obvious signs of well construction problems. The DEL will also confirm what signage is to be posted for the duration of the boil water advisory or the period of time that an alternate supply is in place.

a) No Obvious Signs of Well Construction Problems

Where there are no obvious signs of well construction problems, the owner shall:

1) Immediately disinfect the water source as per the "Well Disinfection Procedures".
2) Re-sample the well 5 days after the well has been disinfected or after confirmatory tests, using a chlorine test kit, indicates the absence of chlorine residual.

It is critical that there be no remaining chlorine residual prior to taking the re-sample from a well that is normally untreated (i.e. does not have a continuous chlorination system).

If the re-sample result indicates the presence of total coliform or *E. coli*, the owner shall:

1) Immediately seek the expertise of a person qualified under the *Well Construction Regulations* to remediate the situation.
2) Within 15 calendar days, submit a report to the DEL outlining the corrective measures that will be taken to remediate the situation, complete with a schedule for implementation of the corrective measures and copies of any water quality results.

b) Obvious Signs of Well Construction Problems

Where there are obvious signs of well construction problems, the owner shall:

1) Immediately seek the expertise of a person qualified under the *Well*

Construction Regulations to remediate the situation.

2) Within 15 calendar days, submit a report to the DEL outlining the corrective measures that will be taken to remediate the situation, complete with a schedule for implementation of the corrective measures and copies of any water quality results.

5.3.3 Surface Water Supplies

Where total coliform or *E. coli* are present, the owner shall:

1) Immediately notify the DEL.
2) Immediately initiate a boil water advisory, in accordance with Section 5.5, or seek an alternate potable water supply until satisfactory bacteriological quality is restored.
3) Immediately re-sample the supply.

The DEL will inspect the registered water supply to verify that the supply is disinfected. The DEL will also confirm what signage is to be posted for the duration of the boil water advisory or the period of time that an alternate supply is in place.

If the re-sample result indicates the presence of total coliform or *E. coli*, the owner shall:

1) Immediately seek the expertise of a person qualified to remediate the situation.
2) Within 15 calendar days, submit a report to the DEL outlining the corrective measures that will be taken to remediate the situation, complete with a schedule for implementation of the corrective measures and copies of any water quality results.

All public water supplies registered under the *Water and Wastewater Facility Regulations* made pursuant to the *Environment Act* that derive their supply from surface water sources shall be disinfected.

5.4 Boil Water Advisories

5.4.1 Deficiencies That Require a Boil Water Advisory

Deficiencies that require a boil water advisory include:

1) Water that does not meet the "Guidelines for Canadian Drinking Water Quality" requirements for total coliform or *E. coli*.
2) Lack of disinfection, where required.
3) Ineffective disinfection, where required, due to high turbidity or high chlorine demand.

4) Suspected cross-connection or negative pressure.
5) Other circumstances which in the opinion of the DEL or the MOH constitutes a risk to public health (e.g. *Giardia*, *Cryptosporidium* contamination, etc.).
6) Evidence of an outbreak of waterborne illness as determined by the MOH (the risk to young children, elderly and immuno-compromised people should be considered in a decision).
7) A serious incidence of raw water contamination.

5.5 Boil Water Advisory Protocol and Signage

5.5.1 Initiating the Boil Water Advisory

Where one or more of the conditions described in Section 5.4.1 exist, the owner shall initiate the boil water advisory and contact the DEL immediately.

In the event that the DEL or the MOH is aware of a potential serious health risk, the DEL will advise the water supply owner to initiate the boil water advisory.

During the boil water advisory there should be frequent communication between the DEL, the MOH and the owner.

5.5.2 Procedure for Notification of Boil Water Advisory

1) The owner will ensure that proper signage is posted to inform consumers of the boil water advisory. Signage must be acceptable to the DEL.
2) If the owner fails to notify the consumers, the DEL will take appropriate steps to notify the consumers.

5.5.3 Instructions for Boiling and Disinfecting Tap Water

During an advisory it is essential that all water to be used for the following activities be boiled:

1) drinking;
2) preparing infant formulas;
3) preparing juices and ice cubes;
4) washing fruits and vegetables;
5) cooking; or
6) dental hygiene.

Detailed Instructions for boiling and disinfecting tap water during a boil water advisory are included in APPENDIX E. Instructions for businesses, institutions, manufacturing plants or health care facilities that may have special requirements when a boil water advisory is in effect are provided in APPENDIX F.

5.5.4 Removing the Boil Water Advisory

The boil water advisory will be removed by the DEL, in consultation with the MOH and the owner. Under normal circumstances the boil water advisory will be removed when:

a) the "Guidelines for Canadian Drinking Water Quality" for bacteriological quality are met for 2 consecutive sets of samples separated by a minimum of 24 hours; and

b) the deficiencies which led to the boil water advisory are corrected.

These guidelines are in effect as of the __ day of ____ , 2004.

DATED at Halifax, in the County of Halifax, Province of Nova Scotia, theday of ____ , 2004.

Deputy Minister of Environment and Labour

APPENDIX A

Sample Collection and Preservation - Microbiological Quality

Container

- Use a sterilized sample bottle containing sodium thiosulfate preservative (a chlorine neutralizer). Bottles are available from your local Department of Environment and Labour office, water quality laboratories, and from some hospitals. A list of approved laboratories is available on the web at: http://www.gov.ns.ca/enla/water/labs/htm.

- Keep sample containers clean and free from contamination before and after collecting the sample. Do NOT open them prior to collecting the sample.

- Examine the sample bottle for cracks, a missing seal, or other signs that its sterility may be compromised. If any of these indications are found, discard the bottle and use a suitable one.

- Label the bottle with the water supply owner's name, location of the water source and/or sampling location, date, and time.

Flush the System

- For locations at which the sample must be collected from a tap, inspect the outside of the faucet. If water leaks around the outside of the faucet, select a different sampling site.

- Remove any aerators, strainers, attachments, or purification devices from the tap.

- If necessary, remove debris and sterilize the faucet outlet, for example by swabbing with a disinfecting wipe.

- DO NOT take samples from a flexible hose or garden hose or outside hose bib. Sample from the cold water faucets only.

- If the sample is to be taken from a tap or a pump, allow the water to run for 5 minutes before collection. This will help to remove stagnant water from the system.

Collect the Sample

- If you have a chlorine disinfection treatment unit, measure and record chlorine residual. Normally free chlorine residual is measured, however, total chlorine residuals may be required on occasion. In either case, the chlorine residual should

be recorded on the lab requisition form and be marked "F" or "T" to indicate free or total chlorine residual, respectively.

- Before taking the sample, reduce the tap flow rate to approximately the width of a pencil before taking the sample. The flow rate should be low enough to ensure that no splashing occurs as the container is filled. Do not adjust the flow rate while taking the sample. At sampling points where water runs continuously, do not adjust flow rate.

- While holding the sample container at the base, remove the seal around the cap before attempting to open the bottle.

- Remove the cap with the free hand. Be careful NOT TO TOUCH the inside of the bottle cap or bottle lip. Continue to hold the cap in one hand with the inside facing down while the bottle is being filled. Do NOT touch the interior of the cap or lay it down. Do NOT breathe on the bottle or cap.

- Do NOT rinse the bottle.

- Fill the bottle to the fill line. Do NOT allow the bottle to overflow. Carefully replace the cap.

- Complete the laboratory requisition form. Include all required information including sampling location, date, time, etc. and who took the sample. Registered water supply owners must also record the registration number. All water samples are to be analysed for total coliform and *E. coli*.

Storage and Transport

- Samples shall be kept in a refrigerator or cooler with ice packs to maintain a temperature of $4^{\circ}C$ until delivered to the lab. Samples should not be frozen.

- Transport the sample to the laboratory as soon as possible and definitely within 24 hours of collection. Check ahead with the lab about days/time deadlines for sample acceptance to ensure meeting the 24-hour criterion.

APPENDIX B

Sample Collection and Preservation - Chemical and Physical Quality

Container

- For most basic parameters, use a clean polyethylene bottle available from water quality laboratories. A list of approved laboratories is available on the web at: http://www.gov.ns.ca/enla/water/labs/htm.
- For additional or specialized parameters, discuss the requirements with the laboratory or a trained professional before sampling.
- Label the bottle with the water supply owner's name, location of the water source and/or sampling location, date, and time.
- Make sure all information on the requisition is filled out completely. Registered water supply owners must also record the registration number.

Flush the System

- If the sample is to be taken from a tap or pump, allow the water to run for 10 minutes if possible before collection. This will help to remove stagnant water that may have artificially elevated metal concentrations from the system.

Collect the Sample

- Rinse the bottle and cap 2 to 3 times unless specialized sampling requires non-rinse procedures.
- Turn flow volume down so that water runs gently.
- Sample for sensitive parameters (organics, metals) first. Filtration and preservation may be necessary for metals, depending on the purpose of sampling.
- Fill bottle to top (overflow) and cap tightly with no air gap.
- If a treatment device is in place to remove any chemical or physical substances, two samples shall be collected, one sample from the raw water source and one sample from a point after treatment.

Storage and Transport

- Samples shall be kept in a refrigerator or cooler with ice packs to maintain a temperature of $4^{\circ}C$ until delivered to the lab. Samples should not be frozen. Samples should be kept in the dark.

- Transport the sample to the laboratory as soon as possible, preferably within 24 hours.

APPENDIX C

The Growth of Biofilm in a Water works System

Introduction

Biofilm in a water works system refers to organic or inorganic surface deposits consisting of microorganisms, microbial products and debris. Biofilm may occur on interior pipe surfaces, in sediments, inorganic tubercles, suspended particles or virtually any substratum immersed in the aquatic environment. Biofilm may be evenly distributed or occur as sporadic random patches.

Public Health Significance

Portions of a biofilm lining the interior of a water pipe may periodically slough off into the passing water thereby seeding it with microorganisms contained in the biofilm. If such bacteria are coliforms, the occurrence must be considered a public health concern until it is proven that a treatment failure or contamination has not occurred. It is difficult to distinguish between a true biofilm event and an unexplained coliform occurrence. Determination of coliform contamination due to biofilm is usually a negative conclusion; that is, there are no observable coliforms in the treatment plant effluent, no identified breakdown in treatment barriers, no apparent cross-connection or other contamination of the water works system (breaks, construction, etc.). While a true coliform biofilm event may not in itself signal a public health risk, it may mask a real contamination event and therefore must be viewed with concern. The onus is on the owner to show that these coliform occurrences are a result of biofilm release into the water supply.

Characteristic of a Situation Where Biofilm May be the Cause of Bacteria Counts Within a Water Works System

- No coliforms are detected in treatment plant effluent.
- Coliform bacteria persist in a water works system samples despite the maintenance of a disinfectant residual.
- Seasonal increase in coliform densities with highest recovery in warm summer months, decreasing in the fall.
- The duration of the coliform episode is prolonged for years.
- Growth of heterotrophic bacteria, detected using the heterotrophic plate count (HPC) method, frequently occurs before coliforms are detected.
- Coliform growth occurs as randomized pattern in the water works system.
- Some predominant coliform species can be identified, such as *Klebsiella*, *Enterobacter* or *Citrobacter*.
- Coliform occurrence persists despite proper operation and maintenance practices being carried out, including: consistently maintaining positive pressure in the water works system, implementing aggressive cross-connection control, thoroughly flushing and disinfecting pipes after construction and repair, providing efficient treatment.

APPENDIX D

Draft Press Release for Boil Water Advisory
(Revise as necessary to fit specific circumstances)

Due to apparent contamination of the _____ public drinking water supply and the possibility of unsafe water, consumers are advised to boil all water for at least 1 minute before drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking, dental hygiene or any other activity requiring human consumption. This is to be done until further notice.

The water utility is doing all it can to determine the cause of the problem and to remedy it as quickly as possible. The water utility, the Department of Environment and Labour and the Medical Officer of Health are continuing to monitor the water quality closely and are working in close consultation.

Detailed instructions on water usage when a boil water advisory is in effect are available from the water utility or the local office of the Department of Environment and Labour.

For further information regarding this notice call:

APPENDIX E

Instructions for Boiling and Disinfecting Tap Water During a Boil Advisory

During an advisory, it is essential that all water to be used for the following activities be boiled:

1) drinking;
2) preparing infant formulas;
3) preparing juices and ice cubes;
4) washing fruits and vegetables;
5) cooking; or
6) dental hygiene.

Holding water at a rolling boil for at least 1 minute will inactivate all waterborne pathogenic micro-organisms. Water can be boiled either in a pot or kettle on a stove, an electric kettle without an automatic shut-off or in a microwave oven. If water is boiled in a microwave, it is advisable to include a glass rod or wooden or plastic stir stick in the container to provide nucleation sites for bubble formation and energy diffusion. This will prevent the formation of superheated water.

Under most circumstances it is not necessary to boil water used for other household purposes. Adults, adolescents and older children may shower, bathe or wash using tap water but should avoid swallowing the water. Toddlers and infants should be sponge bathed. In non-outbreak situations, dishes and laundry may be washed in tap water, either by hand or by machine.

In the event of a waterborne outbreak as declared by the MOH, it may be necessary to advise the public to take additional precautions. In this situation, hands should be washed in a dilute solution of household bleach and water (1 mL or 20 drops per litre of water). This is particularly important before preparing or eating meals, and after using the toilet, changing diapers, and handling animals. The solution should be allowed to stand 10 minutes before use. If dishes are hand washed they should be washed and rinsed in hot tap water, soaked in a dilute solution of household bleach (20 mL of bleach in 10 litres of water) for one minute and air dried. Alternatively, dishwashers with a hot water cycle will disinfect dishes.

Additional instructions for businesses, institutions, manufacturing plants or health care facilities that may have special requirements when a boil water advisory is in effect are provided in APPENDIX F.

APPENDIX F

Users That Must Take Particular Precautions During A Boil Advisory

Commercial Establishments (Restaurants, Hotels, Convenience Stores, etc.)

- All water that is to be provided directly to customers for drinking purposes must be treated by boiling the tap water for at least 1 minute and then storing the water in clean, covered containers until used for serving. An alternative to this would be using commercially available "bottled water". Commercial coffee machines that achieve boiling temperatures as part of their design are exempt (see Note 1).

- All foods (e.g. fruits and vegetables) that need washing are to be rinsed or soaked only in tap water that has been boiled for at least 1 minute.

- Tap water used as an ingredient in any food product that will be "ready to eat" without cooking (e.g. drink mixes, pudding, jellos, etc.) must be boiled for at least 1 minute.

- Ensure that food handlers wash and rinse hands in water that has been treated with chlorine bleach.

- It is not necessary for bakeries to boil water that is part of a recipe or ingredient in a product that is to be baked. Water for other uses must be boiled.

- Disconnect ice machines and discard any ice and crushed ice products that been made from this ice. All ice used during the boil water advisory must originate from tap water that has been boiled for at least 1 minute or from a commercial ice supply distributor. Ice machines at the establishment must be emptied and not used for the duration of the boil water advisory. Lines to ice machines must be disinfected prior to use.

- All soft drink beverage lines connected directly to tap water for mixing must be disconnected for the duration of the boil water advisory. Use bottled water or canned beverages exclusively. Lines to soft drink canisters must be disinfected prior to re-use.

- Disconnect water vending machines unless the water is treated by an approved method. Disinfect lines prior to re-use.

- Disconnect vegetable spraying/sprinkler supplies. Disinfect lines prior to re-use.

- Commercial dishwashers that use hot water 82^{O}C or above are considered satisfactory. Beverage glass washers that utilize a "cold" water rinse must not be used unless the rinse water can be changed to use hot water 82^{O}C or above.

Manually washed and sanitized dishes must be rinsed with "hot" water more than 82°C for a final step.

- All employees reporting that they are suffering from a diarrhoeal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good handwashing should be emphasized for all staff.

Notes:

1. Commercial coffee brewers generally operate at a brew temperature of 88°C - 90°C with this temperature being thermostatially maintained in the water tank. Brewing is achieved by displacement of the hot water with cold water within the tank. The temperature attained by the hot water will control bacterial and protozoic organisms of concern during a boil water advisory.

   The temperature of the water should be verified using a metal stem probe thermometer by running a full cycle of the brewer with water, taking the temperature at a point below the funnel when the decanter is half full. The temperature at this point should be 72°C or higher.

   The decanter used for filling the brewer with water should not be used for receiving the coffee before being washed and sanitized.

   This exemption is not applicable to non-commercial or domestic type coffee brewers as there may be wide variations of temperatures in these machines.

<u>Upon rescinding of a boil water advisory:</u>

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer's specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when re-starting the equipment.

- Managers of large buildings with water-holding reservoirs should consult with their facility engineer and health department about draining the reservoir.

- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each.

- Run water softeners through a regeneration cycle.

- Drain and refill hot water heaters if set at a low temperature (below 64.2°C).

- Consult your facility engineer regarding pool and/or whirlpool operations.

Food Production

- Dairy Plants - The contaminated water must not contact products following the pasteurization procedure and water used in clean-in-place procedures and in cleaning of product related equipment must be properly chlorinated.

- Bottling Plants - Pre-superchlorination and chorine removal must be a part of production procedure.

- Ice Making - It is prohibited to make ice for domestic purposes or for cooling or preservation of food for the duration of the boil water advisory unless the water has undergone proper treatment to inactivate microbial pathogens.

Hospitals, Clinics, Long Term Care Facilities, Nursing Homes, Etc.

- Boil water or use alternate potable water supply in all applications of tap water intended for human consumption or treatment procedures where a risk of infection is possible. **Assess all water usage in consultation with infection control personnel.**

- Patients and employees should not consume tap water that has not been disinfected, ice or drinks made with tap water that has not been disinfected, or raw foods rinsed with tap water that has not been disinfected.

- Disconnect ice machines and discard any ice and crushed ice products that been made from this ice. All ice used during the boil water advisory must originate from tap water that has been boiled for at least 1 minute or from a commercial ice supply distributor. Ice machines at the establishment must be emptied and not used for the duration of the boil water advisory. Lines to ice machines must be disinfected prior to use.

- For other food preparation and handwashing guidance, refer to the information provided under the "commercial establishments" heading above.

- Disinfect water by:
    - Boiling at a rapid, rolling boil for 1 minute;
    - Filtering through a reverse osmosis filter, an “absolute 1 micron” filter; or
    - Safe alternative sources of potable water include bottled, treated or distilled water.

- All employees reporting that they are suffering from a diarrhoeal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good handwashing should be emphasized for all staff.

- Restrict burn patients and patients with open sores or wounds from whirlpool treatments.

- Monitor patients closely for signs and symptoms of gastrointestinal illness.

- Sanitize dishes by washing in dishwashing machines that have a hot water cycle at 82 ^{O}C or above.

Notes:

- Renal dialysis units are routinely treated with water using reverse osmosis. This is considered an acceptable treatment process for publicly supplied water under a boil water advisory.

Upon rescinding of a boil water advisory:

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer's specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when re-starting the equipment.

- Managers of large buildings with water-holding reservoirs should consult with their facility engineer and health department about draining the reservoir.

- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each.

- Run water softeners through a regeneration cycle.

- Drain and refill hot water heaters if set at a low temperature (below 64.2^{O}C).

- Resume usual bathing practices and care for patients with breaks in the skin.

- Consult your facility engineer regarding pool and/or whirlpool operations.

Day Care Facilities

- Day care facilities in areas where a boil water advisory is in effect should be contacted and advised to use boiled or disinfected water for drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables and for all hand washing.

- Children and employees should not consume tap water that has not been disinfected, ice or drinks made with tap water that has not been disinfected, or raw foods rinsed with tap water that has not been disinfected.

- Disinfect water by:
    - Boiling at a rapid, rolling boil for 1 minute;
    - Filtering through a reverse osmosis filter, an "absolute 1 micron" filter; or
    - Safe alternative sources of potable water include bottled, treated or distilled water.

- All employees reporting that they are suffering from a diarrhoeal illness must be excluded from work and should be tested by their family doctor. They are not to return to work until symptoms have subsided. Good handwashing should be emphasized for all staff.

- Sanitize dishes by washing in dishwashing machines that have a hot water cycle at 82^{O}C or above.

Upon rescinding of a boil water advisory:

- Re-start and flush any water-using fixture or piece of equipment in accordance with the manufacturer's specifications. This may vary from fixture to fixture. Consult your facility engineer and/or manufacturer when re-starting the equipment.

- Managers of large buildings with water-holding reservoirs should consult with their facility engineer and health department about draining the reservoir.

- Follow the directions of your water utility or, as general guidance, run cold water faucets and drinking fountains for 3 minutes each if they have not been used in the last 24 hours.

- Run water softeners through a regeneration cycle.

- Drain and refill hot water heaters if set at a low temperature (below 64.2^{O}C).

Dental Offices

- Dentists, in areas where a boil water advisory is in effect, should be contacted and advised to use boiled or bottled water for patients to drink or rinse and for all hand washing.

- It is also recommended that the high/low speed turbines run dry and a hand syringe of boiled water or sterile saline be used for cooling/rinsing the tooth and/or oral tissues.

- Regular hand piece maintenance (i.e. oiling and sterilizing) should continue per the manufacturer's instructions.

- To avoid any potential risk of contamination from the water supply that could occur from and during inadvertent use of dentist equipment with contaminated water during the advisory, dentists are advised to turn off the water supply to their dental units and sinks. If this is not possible, covering or taping the controls or outlets may be indicated (e.g. triplex syringe, water dispenser, cavitron, etc.).

Water Vending Outlets (Includes Wine and Beer Vending)

- Assess each system individually.